

By Express Mail # EV601220891US · January 7, 2005

Amendments to the Title:

Please replace the title of invention at page 1 with the following new title:

-- LINEAR DRIVE ARRANGEMENT FOR A SLIDING DOOR --

Amendments to the Specification:

Please delete the sub-heading before paragraph [0001] and add the following new sub-headings and paragraph:

– PRIORITY CLAIM

This is a U.S. national stage of application No. PCT/EP2003/013872, filed on 8 December 2003. Priority under 35 U.S.C. §119(a) and 35 U.S.C. §365(b) is claimed from German Application No. 102 57 582.7, filed 9 December 2002.

BACKGROUND OF THE INVENTION

1. Field of the Invention --

Please add before paragraph [0002] the following new sub-heading:

-- 2. Description of the Related Art --

Please replace paragraph [0003] with the following amended paragraph:

[0003] ~~[EP 0 671 071 B1]~~ U.S. Patent No. 5,712,516 describes a linear drive for a sliding door. In this drive, a stationary long-stator is located above the movable leaf. The individual coils are distributed along the entire length of the stator, namely, in an equally spaced manner. The yoke of the stator comprises bars disposed transverse to a longitudinally arranged yoke part. The side of the transversely arranged yoke segments that faces the leaf is connected by a ferromagnetic plate to spacer strips arranged thereon. Permanent magnets are located ~~[inside]~~ on the movable leaf. When the movable leaf is ~~[brought into connection with]~~ fixed to the plate described above, the leaf is suspended at the stator due to the magnetic force of the permanent magnets. Due to the presence of spacer rollers at the end and at the beginning of the displaceable leaf, there is a defined air gap between the permanent magnets and the spacer strips or plate. ~~[The purpose of the rollers is to carry out the displacing movement of the leaf. At the same time, they are needed for a constant spacing of the permanent magnets relative to the stator.]~~ When current is supplied to the coils, the

magnetic field thereby generated inside the stator is advanced so that the suspended door can continue moving.

Please add before paragraph [0004] the following new sub-heading:

-- **SUMMARY OF THE INVENTION** --

Please delete paragraph [0005] in entirety.

Please replace paragraph [0006] with the following amended paragraph:

[0006] The rocking motion occurring just at the start and end of the movement process of the sliding door can be reliably prevented ~~[in that a]~~ by providing the guide carriage [is provided] with at least one supporting roller which is supported at least at times on a guide track.

Please delete paragraph [0015] in entirety.

Please add before paragraph [0016] the following new sub-heading:

-- **BRIEF DESCRIPTION OF THE DRAWINGS** --

Please add before paragraph [0017] the following new sub-heading:

-- **DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS**

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Please replace paragraph [0017] with the following amended paragraph:

[0017] Figure 1 shows an overall view of a linear drive 1 according to the invention. The linear drive 1 is accommodated in a holder 2 (see Figure 23) which can be fastened to a building part (not shown). The linear drive 1 itself comprises a stationary guide rail 3 mounted in the holder 2 and a guide carriage 4 which is displaceable in the guide rail 3. A

sliding door 5 (see Figure [4] 10) which is movable in longitudinal direction of the guide rail 3 is mounted at the guide carriage [3] 4. The guide carriage 4 is shown in detail in Figure 2.

Please replace paragraph [0020] with the following amended paragraph:

[0020] Further, the aligning device 9 [~~which was already described~~] is provided at the respective ends of the supporting rail 10. The sliding door 5 can be aligned with respect to the supporting rail 10 by means of this aligning device 9. The aligning device 9 will be described in more detail later in connection with Figures 14 to 17.

Please replace paragraph [0021] with the following amended paragraph:

[0021] The holding member 12 [~~provided in the channel 11 of the supporting rail 9, which channel 11 opens upward,~~] comprises a plurality of individual holders 14. Figure 3 shows an individual holder 14 of this type. The holder 14 has a base 15 which can be inserted into the C-shaped channel 11 at the supporting rail 10. The base 15 is provided at its front end with a connection element 16 and at its rear end[~~, respectively,~~] with a connection element [46] 116 which makes it possible to connect a plurality of individual holders 14 to one another in order to form the holding member 12. In the present embodiment example, the connection elements 16 which are constructed in a complementary manner comprise a partially circular locking receptacle 116 at one end and a partially circular locking projection 16 at the other end. The locking projection 16 is inserted into the locking receptacle 116 in such a way that the individual holders 14 are swivelable relative to one another in the plane of the base 15 in order to compensate for tolerances. The connection elements 16 can be inserted [~~one inside the other~~] in the elements 116 either in vertical direction or in horizontal direction. To enable insertion [~~of the connection elements 16 one inside the other~~] in the horizontal direction, the connection elements 16 are formed elastically so that the partially circular [~~ring~~] projection 16 is compressed by a corresponding wedge-shaped insertion ramp at the partially circular locking receptacle [~~and can then be slid into the locking receptacle~~] 116.

Please replace paragraph [0022] with the following amended paragraph:

[0022] A receptacle 17 serving to support the magnets 13 extends upward from the base 15. The receptacle 17 is shorter than the base 15 so that a space is formed between the individual receptacles 17 when a plurality of holders 14 are joined. Further, each receptacle 17 has two channel-shaped pockets 18 which are arranged on opposite ~~[sides]~~ ends of the receptacle 17. The magnets 13 can be inserted into these channel-shaped pockets 18 in such a way that they bridge the distance between two receptacles 17 as is shown in Figure 2. Vertically extending strips 19 which serve to guide the holders 14 at the inner sides of the slide rails 6 are provided on the outer sides of the receptacles 17. These strips 19 either have a slight air gap relative to the slide rails 6, e.g., 0.1 mm, or contact the slide rails 6 directly without an air gap.

Please replace paragraph [0023] with the following amended paragraph:

[0023] Construction variants of the holder are shown in Figures 7 and 8. Figure 7 shows a holder 14 which is inserted into the supporting rail 10 as an end piece and which, for this reason, is provided with a pocket 18 on only one ~~[side]~~ end, while the ~~[side]~~ end shown in Figure 7 is planar, i.e., formed without a pocket.

Please replace paragraph [0025] with the following amended paragraph:

[0025] Figure 8 shows an entirely different holder 14 in which the base 15 is not shown for reasons of simplicity. This holder 14 has an H-shaped construction as seen from the top and the pockets 18 open upward. Accordingly, ~~[it is not required to provide the construction of the supporting rail 10 in the manner described above. Rather,]~~ all of the holders 14 can be inserted in the supporting rail 10 one behind the other. The magnets 13 are then inserted from above into the pockets 18 of the holders 14 and the pockets 18 ~~[which open upward]~~ are finally closed by a cover 20 (see Figures 12 and 13) which preferably covers a plurality of pockets 18 or inserts 22.

Please replace paragraph [0029] with the following amended paragraph:

[0029] Figure 13 shows a side view of another embodiment form of the holding member 12 in connection with the sliding door 5. The holding member 12 shown in this case comprises holders 14, each of which has a plurality of inserts 22 which open upward and in which the magnets 13 can be inserted. In this case also, the inserts 22 are closed by a cover 20. Another difference with respect to the holders 14 shown in Figures 10 to 12 [~~also consists in~~] is that the magnets 13 in the holders 14 according to Figures 10 to 14 are open toward the side, i.e., toward the slide rails 6, while the magnets 13 in the holder 14 according to Figure 13 are also enclosed toward the side by the holder 14 and side walls of the inserts 22.

Please replace paragraph [0030] with the following amended paragraph:

[0030] Figures 14 to 17 show the individual parts of an aligning device 9 which is preferably constructed as an eccentric adjustment and by means of which the sliding door 5 connected to the supporting rail 10 can be aligned. For this purpose, a series of transverse through-holes 23 [~~extending in horizontal direction transverse to the longitudinal extension of the supporting rail 10 is~~] are arranged in the respective end portions of the supporting rail 10.

Please replace paragraph [0031] with the following amended paragraph:

[0031] Also belonging to the aligning device 9 is a shoe 24 which has two vertically oriented plates 25 making contact with the lateral surfaces of the supporting rail 10 and a horizontally oriented fastening plate 26 connecting the two plates 25 at one of their ends. A [~~quantity~~] number of aligning slots 27 corresponding to the [~~quantity~~] number of through-holes 23 in the supporting rail 10 is provided in the plates 25. [~~Since three through-holes 23 are provided in the present embodiment example, three aligning slots 27 are consequently also arranged in the plates 25.~~] The [~~arrangement of the aligning slots 27 is carried out in such a way that the~~] two outer aligning slots 27 are formed as vertically extending elongated holes, while the center aligning slot 27 has a horizontal T shape. [~~An elongated hole 28 which extends in direction of the through-holes 23 and~~] A transverse slot 28 in the fastening

plate 26 serves to receive a connection element, not shown, for attaching the sliding door 5 [~~is arranged in the fastening plate 26~~].

Please replace paragraph [0032] with the following amended paragraph:

[0032] Also belonging to the aligning device 9 is a shaft 29 having a circular cross section in its central area and a square 30 at both ends (see Figure 16) and a swiveling arm 31 shown in Figure 17. The swiveling arm 31 has a [receiving] square opening 32 for receiving the square 30 [~~of the shaft 29 at one end~~] and a cam 33 [~~at its other end, this cam 33 being~~] formed in the present embodiment [~~example as~~] with a hexagon socket [~~screw~~].

Please replace paragraph [0037] with the following amended paragraph:

[0037] Figures 19 to 21 show another embodiment form of the aligning device 9 which is likewise preferably constructed as an eccentric adjustment and which can be used particularly with the supporting rail 10 according to Figure 18. This aligning device 9 is not arranged laterally at the supporting rail 10 as is the aligning device 9 according to Figures 15 to 17, but rather at the [~~front~~] side of the supporting rail 10. The aligning device 9 has an L-shaped angle support 37 that can be arranged at the front side of the supporting rail 10 and an eccentric shaft 38 associated with each angle support 37. A leg 39 of the angle support 37 has two [~~elongated holes 40 which extend transverse to this leg 39 and~~] transverse slots 40 which serve to fasten the sliding door 5 [~~that can be~~] arranged at the angle support 37. Another leg 41 of the angle support 37 which is wider than the leg 39 and which projects beyond the sides of the latter [~~likewise~~] has two [~~elongated holes~~] vertical slots 42 in the projecting area which extend transverse to this leg 41 and which serve to connect to the [~~front~~] side of the supporting rail 10. Further, a vertical slot 43 which opens toward one side [~~and which extends in the same direction as the elongated holes 42~~] is provided in the middle between the two elongated holes 42. On the side remote of the leg 39, a receiving channel 44 extending transverse to the slot 43 and to the [~~elongated holes~~] slots 42 is arranged in the leg 41 and intersects the slot 43.

Please replace paragraph [0039] with the following amended paragraph:

[0039] The aligning device 9 according to Figures 18 to 21 is used in the following manner: The shaft stub 45 of the eccentric shaft 38 is inserted into the longitudinal channel 36 of the supporting rail 10. The angle support 37 is then placed with its leg 41 against the supporting rail 10 in such a way that the cam 46 can engage in the receiving channel 44. In this position, the engagement [~~opening~~] socket 47 can be reached through the slot 43. In order to align the supporting rail 10 to the sliding door 5, the eccentric shaft 38 is rotated by means of a tool of the like. In so doing, the shaft stub 45 rotates in the longitudinal channel 36 and the cam 46 slides into the receiving channel 44. After alignment, fastening bolts[~~, not yet shown, which are~~] arranged in the [~~elongated holes~~] slots 42 are tightened [~~and the position, once it has been adjusted, is held permanently~~].

Please replace paragraph [0043] with the following amended paragraph:

[0043] It can also be seen from Figure 23 that a supporting roller 53, shown in detail in Figure 24, is arranged at the guide carriage 4 in the front area and rear area, respectively. These supporting rollers 53 stabilize the sliding door 5 when starting and braking and accordingly prevent a rocking motion of the sliding door 5. The supporting rollers 53 [~~comprise~~] are each journaled on a bearing shaft 54 which penetrates the supporting rail 10 in a bore hole 55 (see Figure 14). A freely rotatable roller [~~56~~] 53 running on a guide track 57 of the holder 2 is arranged at one end of the bearing shaft 54 eccentric to the shaft axis (see Figure 23). A thread[~~, not shown, which~~] 56, Figure 24A, serves to receive a fastening screw is arranged at the other end of the bearing shaft 54. The roller [~~56~~] 53 is preferably detachably arranged at the bearing shaft 54 so that the roller [~~56~~] 53 can be exchanged easily if necessary. The supporting rollers 53 [~~are arranged in such a way that~~] both [~~rollers 56~~] lie on the same side of the supporting rail 10. Due to the eccentric support of the roller [~~56~~] 53 relative to the shaft axis, the roller [~~56~~] 53 can be adjusted in its position by rotating the bearing shaft 54 and in this way can be exactly aligned with the guide track 57.

Please replace paragraph [0044] with the following amended paragraph:

[0044] It is not necessary that the supporting rollers ~~[54]~~ 53 roll on the guide track 57 throughout the entire movement of the sliding door 4. Rather, the rollers ~~[56]~~ 53 can also have a slight distance, e.g., of a few tenths of a millimeter, from the guide track 57 because the sliding leaves of the sliding door 5 are suspended in a hovering state by means of the magnetic force of the magnets 13. The hovering state is interrupted during starting and braking by the rocking motion of the sliding door 4. Depending on the selected distance, even a barely perceptible rocking motion can be sufficient to overcome the distance. Accordingly, the rollers ~~[56]~~ 53 would roll on the movement path 57 only in the acceleration phase and braking phase, while they are at a distance from the guide track 57 during the normal movement of the sliding door 4 and accordingly also do not cause any additional friction, since the sliding door 5 is also in a hovering state.

Please delete paragraph [0046] in entirety.

Please delete the sub-heading at page 13, and insert the following heading and sub-heading:

-- CLAIMS

What is claimed is --